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FORMALDEHYDE SEED TREATMENT FOR LOOSE AND COVERED SMUTS OF OATS

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Loose and covered smuts of oats are seed-borne diseases and are among the most destructive that attack the oat crop in Florida. In individual fields, from 5 to 50 percent or more of the plants may be smutted, depending upon the amount of infection in the seed. Treating the seed with formaldehyde will control both loose and covered smut effectively.

LOOSE SMUT

Loose smut is caused by the fungus *Ustilago avenae* (Pers.) Jens. The disease is first evident as the head or panicle of the oat plant emerges. Diseased plants are usually slightly shorter and the heads stand erect and do not form a spreading panicle like the healthy ones. The diseased panicle is covered with a loose, black, sooty powder, for the individual spikelets are almost completely transformed into black smut spores. Sometimes the uppermost leaf of the plant is smutted. Soon after a diseased panicle emerges, the delicate membrane surrounding the smutty mass ruptures and the spores are blown or washed away. At flowering time, the spores are carried by the wind to healthy panicles and lodge on the outside of the glumes or in the crevices between the glumes and the developing seed. Here the spores may remain dormant until the seed is planted, but usually they germinate immediately and infect the seed. When infected oats are planted, the fungus penetrates the young seedling and grows up with the plant without any external signs of disease until the flowering stage is reached. As the young floral parts are formed, the fungus replaces them with its own fruiting bodies.

COVERED SMUT

Covered smut of oats is caused by the fungus *Ustilago levis* (Kell. and Sw.) Magn. Covered smut occurs much less fre-

quently than loose smut in Florida. The symptoms of both diseases are very similar. However, in covered smut, the affected heads appear to be almost normal at emergence and have a more spreading and drooping panicle than plants with loose smut. The covered smut does not destroy the panicle so completely as the loose smut. Although the kernel is replaced by a mass of black spores as in loose smut, outer glumes are only partially destroyed. The spikelet retains its normal shape and the membrane enclosing the black spore mass is usually not ruptured until harvest or threshing time. When the grain is threshed, the smutted heads are broken and the spores are dusted over the sound kernels. These spores germinate during storage and infect the grain. When oats are sown, the fungus, which has remained dormant in the seed, becomes active again and enters the young seedling and keeps pace with the growing tip of the plant, finally entering the developing kernels and producing a new crop of spores.

TREATMENT

Formalin is recommended for the control of both loose and covered smut in the ordinary hulled varieties of oats, as it has sufficient penetrating power to destroy the spores of the fungus on the grain and the resting mycelium in the glumes and kernels. The oats to be treated are placed in a pile on a clean floor, canvas, or in a wagon box. Dilute one pint of 40 percent formaldehyde solution (formalin) with one pint of water. One quart of this solution is sufficient to treat 50 bushels of grain. If more or less than 50 bushels are treated, the amount of diluted formaldehyde solution should be correspondingly increased or diminished. This solution is sprayed on the oats while they are being turned with a shovel. A quart size, single action, hand sprayer is used in applying the formalin solution, which should leave the sprayer as a coarse mist. The treatment can be made best by two men. As one man shovels the grain from one pile to the next, the other sprays a little of the solution over each shovelful. In order to avoid irritation of the eyes, nose and throat from the strong formaldehyde fumes, the treatment should be made where there is a good circulation of air and with the sprayer held close to the grain. After the oats are treated, they should be piled in a heap and covered with clean blankets or canvas, which have been sprayed inside and outside with the formalin solution. After five hours the seed should be uncovered. The treatment can be made several weeks ahead of planting or on the same day as the seed are sown.